

WHAT IS CLAIMED IS:

1. A method to recover brine from a drilling fluid or other well servicing fluid comprising filtering said fluid with a rotary vacuum filter to recover at least a portion of said brine in said fluid, wherein said fluid is treated with a filtering aid.

2. The method of claim 1, wherein said rotary vacuum filter is a drum filter.

3. The method of claim 1, wherein said rotary vacuum filter is a disc filter.

4. The method of claim 1, wherein said rotary vacuum filter is a horizontal belt filter.

5. The method of claim 1, wherein said rotary vacuum filter is a horizontal scroll discharge.

6. The method of claim 1, wherein said rotary vacuum filter is a horizontal tipping pan.

7. The method of claim 1, wherein a filter cloth is present on said filter.

8. The method of claim 2, wherein a filter cloth is present on said drum filter.

9. The method of claim 8, wherein said filter cloth is polypropylene.

10. The method of claim 8, wherein said filter cloth has a pore size of from about 75 microns to about 90 microns.

11. The method of claim 7, wherein a precoat filter media layer is present on said filter cloth.

12. The method of claim 8, wherein a precoat filter media layer is present on said filter cloth.

13. The method of claim 12, wherein said precoat filter media layer is from about 1 cm thick to about 15 cm thick.

14. The method of claim 2, wherein a precoat filter media layer is present on said drum

filter.

15. The method of claim 12, wherein said precoat filter media layer comprises diatomaceous earth, perlite, cellulose, or combinations thereof.

16. The method of claim 2, wherein said drum filter is rotated during said process such that said drum filter is partially submerged in said drilling fluid.

17. The method of claim 12, wherein during filtering, solids present in said drilling fluid become present on the surface of the precoat filter media layer, and said solids are removed to expose a fresh surface of the filter media layer.

18. The method of claim 17, wherein said solids are removed with a knife blade.

19. The method of claim 18, wherein said knife blade continuously removes said solids.

20. The method of claim 18, wherein said knife blades continuously removes said solids, and said knife blade moves at a rate of from about 0.005 mm to about 100 mm per hour.

21. The method of claim 1, wherein said drilling fluid is heated above ambient temperature prior to and/or during said filtering.

22. The method of claim 2, wherein said drilling fluid is heated above ambient temperature prior to and/or during said filtering.

23. The method of claim 2, wherein said drilling fluid is heated to a temperature of at least about 50°C.

24. The method of claim 2, wherein said drilling fluid is heated to a temperature of from about 20°C to about 180°C.

25. A method to purify brine in a brine containing solution comprising filtering said

brine containing solution with a rotary vacuum filter to recover at least a portion of said brine having a higher purity than the brine present in the starting brine containing solution, wherein said brine containing solution is treated with a filtering aid.

26. The method of claim 25, wherein said rotary vacuum filter is a drum filter.

27. The method of claim 1, wherein said filtering aid comprises at least one alkali metal hydroxide or polyelectrolyte or both.

28. The method of claim 2, wherein said filtering aid comprises at least one alkali metal hydroxide or polyelectrolyte or both.

29. The method of claim 1, wherein said filtering aid comprises sodium hydroxide or potassium hydroxide or both.

30. The method of claim 2, wherein said filtering aid comprises sodium hydroxide or potassium hydroxide or both.

31. The method of claim 2, wherein said polyelectrolyte comprises iron salt, aluminum salt, cationic polymer flocculant, anionic polymer flocculant, or combinations thereof.

32. The method of claim 2, wherein said filtering aid is present in an amount of from about 0.1 kiloliter to about 35 kiloliters per m³ of drilling fluid.

33. The method of claim 16, wherein said drum filter is rotated at a speed of from about 0.05 to about 5 rpm.

34. The method of claim 14, wherein a vacuum is applied to the inside of the drum filter to draw said drilling fluid through said precoat filter media, wherein said brine is separated from said drilling fluid.

35. The method of claim 14, wherein a vacuum is applied to the inside of a drum filter to draw said drilling fluid through said precoat filter media layer, wherein solids and polymers

present in said drilling fluid are substantially removed and remain as a coating on the surface of the precoat filter media layer, and wherein said brine passes through the precoat filter media layer for recovery.

36. The method of claim 35, wherein said brine is collected into a tank.

37. The method of claim 35, further comprising spraying the outside surface of said drum filter with water.

38. The method of claim 1, further comprising treating the brine separated from the fluid with a pH agent to lower the pH.

39. The method of claim 2, further comprising treating the brine separated from the fluid with a pH agent to lower the pH.

40. The method of claim 39, wherein said pH is lowered to a pH of about 7 to about 12.

41. The method of claim 1, wherein said brine comprises formate, acetate, chloride, bromide, iodide, tungstate, carbonate, bicarbonate, or nitrate salts of ammonium, sodium, potassium, cesium, rubidium, lithium, calcium, magnesium, zinc, or barium, or a blend of two or more of these salts.

42. The method of claim 2, wherein said brine comprises formate, acetate, chloride, bromide, iodide, tungstate, carbonate, bicarbonate, or nitrate salts of ammonium, sodium, potassium, cesium, rubidium, lithium, calcium, magnesium, zinc, or barium, or a blend of two or more of these salts.

43. The method of claim 1, wherein said brine comprises at least one formate salt and/or tungstate salt.

44. The method of claim 2, wherein said brine comprises at least one formate salt

and/or tungstate salt.

45. The method of claim 1, wherein said brine comprises cesium formate, potassium formate, cesium tungstate, potassium tungstate, or combinations thereof.

46. The method of claim 2, wherein said brine comprises cesium formate, potassium formate, cesium tungstate, potassium tungstate, or combinations thereof.

47. The method of claim 1, wherein said brine comprises cesium formate or cesium acetate or both.

48. The method of claim 2, wherein said brine comprises cesium formate or cesium acetate or both.

49. The method of claim 1, wherein said rotary vacuum filter is a continuous rotary vacuum filter.

50. The method of claim 2, wherein said rotary vacuum filter is a continuous rotary vacuum filter.

51. A well servicing fluid or drilling fluid comprising recycled brine.

52. The fluid of claim 51, wherein said recycled brine has a purity of at least about 95%.

53. The fluid of claim 51, wherein said recycled brine comprises cesium formate or cesium acetate or both.

54. The fluid of claim 51, wherein said brine comprises a formate, acetate, chloride, bromide, iodide, tungstate, carbonate, bicarbonate, or nitrate salt of ammonium, sodium, potassium, cesium, rubidium, lithium, calcium, magnesium, zinc, or barium, or blends of two or more of these salts.

55. The method of claim 1, wherein said method is mobile.

56. The method of claim 1, wherein said method occurs on a drilling rig.
57. The method of claim 1, wherein said method occurs on a floating drilling rig.
58. The method of claim 1, wherein said method occurs on a ship or other floating vessel.
59. A method to recover brine from a drilling fluid or other well servicing fluid comprising treating said drilling fluid with a filtering aid and filtering said fluid to recover at least a portion of said brine in said fluid.
60. The method of claim 59, wherein said filtering is with a centrifuge, membrane, filter paper, or combinations thereof.
61. The method of claim 59, wherein said filtering aid comprises at least one alkali metal hydroxide or polyelectrolyte or both.
62. The method of claim 59, wherein said filtering aid comprises at least one alkali metal hydroxide or polyelectrolyte or both.
63. The method of claim 59, wherein said filtering aid comprises sodium hydroxide or potassium hydroxide or both.
64. The method of claim 61, wherein said polyelectrolyte comprises iron salt, aluminum salt, cationic polymer flocculant, anionic polymer flocculant, or combinations thereof.
65. The method of claim 59, wherein said filtering aid is present in an amount of from about 0.1 kiloliter to about 35 kiloliters per m³ of drilling fluid.
66. The method of claim 59, further comprising treating the brine separated from the fluid with a pH agent to lower the pH.
67. The method of claim 66, wherein said pH is lowered to a pH of about 7 to about

12.

68. The method of claim 59, wherein said brine comprises formate, acetate, chloride, bromide, iodide, tungstate, carbonate, bicarbonate, or nitrate salts of ammonium, sodium, potassium, cesium, rubidium, lithium, calcium, magnesium, zinc, or barium, or a blend of two or more of these salts.

69. The method of claim 59, wherein said brine comprises at least one formate salt or tungstate salt.

70. The method of claim 59, wherein said brine comprises cesium formate, potassium formate, cesium tungstate, potassium tungstate, or combinations thereof.

71. The method of claim 59, wherein said brine comprises cesium formate or cesium acetate or both.

72. The method of claim 59, wherein said drilling fluid is heated above ambient temperature prior to and/or during said filtering.

73. The method of claim 59, wherein said drilling fluid is heated to a temperature of at least about 50°C.

74. The method of claim 59, wherein said drilling fluid is heated to a temperature of from about 20°C to about 180°C.

75. The method of claim 1, wherein said filtering of the drilling fluid or other well servicing fluid produces waste material which then is washed to remove any additional brine present on the waste material.

76. The method of claim 75, wherein said additional brine is filtered in order to obtain a more purified version of said brine.

77. The method of claim 76, wherein said filtering of said additional brine is achieved

with a rotary vacuum filter.

78. The method of claim 75, wherein said waste material comprises drill cuttings.